

**Remarks**

Claims 1, 5, and 10 have been amended. New claims 11-17 have been added. Claims 1-17 are pending.

Examination and reconsideration of the application as amended is requested.

Support for the amendments to claim 1 can be found in the specification as filed, for example, on page 12 lines 5-6 and Example 3 on page 19 lines 23-25. Support for the amendments to claim 10 can be found in the specification as filed, for example, on page 13 lines 23-28 and page 14 lines 5-15.

Support for new claims 11 and 12 can be found in the specification, for example, on page 6 lines 8-9 and 18-26, and Fig. 1. Support for new claims 13 and 14 can be found in the specification, for example, on page 15 lines 10-27 and Fig. 2. Support for new claims 16 and 17 can be found in the specification, for example, on page 15 line 28 through page 16 line 12 and Fig. 3.

**§ 112 Rejections**

Claim 5 stands rejected under 35 U.S.C. § 112, second paragraph, as purportedly being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention.

The Examiner stated that the term "synthetic rubber type resin" was a relative term that rendered the claim indefinite. It is believed that the enclosed amendment overcomes this rejection. Applicants submit that the rejection of claim 5 under 35 U.S.C. § 112, second paragraph, has been overcome, and that the rejection should be withdrawn.

**Drawings**

The Examiner objected to the drawings because Figure 4 was not present. A figure showing a heat transfer sheet between an LSI chip and heat radiation fins in an LSI device is not essential to understanding the invention. The description in the specification as filed fully explains this device. Thus, the references to this figure on pages 6 and 19 have been deleted to overcome this objection, and the objection should be withdrawn.

**§ 102 Rejections**

Claims 1-7 stand rejected under 35 U.S.C. § 102(b) as purportedly being anticipated by Nishizawa (U.S. Patent No. 5,741,579).

The Examiner stated that Nishizawa described a heat conductive sheet comprising a substrate and a silicone gel with inorganic heat-conductive particles. As to claim 4, the Examiner acknowledged that Nishizawa does not describe holding the substrate on a support during the coating process, but asserted that the resulting product would be the same.

The foil of Nishizawa ranges from 0.03 to 0.20 mm (preferably 0.05 to 0.10 mm) (see col. 3 ll. 60-62). In contrast, claim 1 as amended requires a very thin substrate, having a thickness from 1 to 12  $\mu\text{m}$  (0.001 to 0.012 mm). Nishizawa does not describe, teach, or suggest heat conductive sheets having a substrate thickness of 1 to 12  $\mu\text{m}$ . Thus, Nishizawa cannot anticipate the claimed invention. In addition, Nishizawa teaches away from the invention stating that aluminum foils thinner than those described cannot be mechanically strong enough to withstand breaking or deformation (see col. 3 ll. 62-64). Thus, the invention provides, *inter alia*, a substrate having a maximum thickness of less than one-half the minimum thickness preferred by the reference in a heat conductive sheet with greater flexibility and with lower resistance to thermal energy transfer than the reference.

The rejection of claims 1-7 under 35 U.S.C. § 102(b) as purportedly being anticipated by Nishizawa has been overcome and should be withdrawn.

Claims 1-7 stand rejected under 35 U.S.C. § 102(b) as purportedly being anticipated by WO 99/05722 to Parker-Hannifin Corp. (hereinafter PHC).

The Examiner stated that PHC described a double-sided adhesive tape with two different adhesives each having inorganic fillers. As to claim 4, the Examiner acknowledged that PHC does not describe holding the substrate on a support during the coating process, but asserted that the resulting product would be the same.

The reinforcement member of PHC ranges from 0.0127 to 0.127 mm (preferably 0.05 mm for metal foil) (see page 15 ll. 14-15). In contrast, claim 1 as amended requires a very thin substrate, having a thickness from 1 to 12  $\mu\text{m}$ . PHC does not describe, teach, or suggest heat conductive sheets having a substrate thickness of 1 to 12  $\mu\text{m}$ . Thus, PHC cannot anticipate the claimed invention.

In summary, the rejection of claims 1-7 under 35 U.S.C. § 102(b) as purportedly being anticipated by Nishizawa or Parker Hannifin has been overcome and should be withdrawn.

**§ 103 Rejections**

Claim 9 stands rejected under 35 U.S.C. § 103 as purportedly being unpatentable over WO 99/05722 to Parker-Hannifin Corp. (PHC) standing alone.

The Examiner acknowledged that PHC did not anticipate claim 9. The Examiner concluded that it would have been obvious to select a combination of both silicon carbide and boron nitride particles from the list in PHC and then to include this combination in the silicone adhesive side of the PHC double-sided tape.

To establish a *prima facie* case of obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. MPEP § 2143.03. The Office Action cites no additional reference to teach or suggest the missing claim limitations recited above. Thus, the *prima facie* case of obviousness has not been met and the rejection should be withdrawn.

Claim 8 stands rejected under 35 U.S.C. § 103 as purportedly being unpatentable over Parker-Hannifin Corp. (PHC) in view of Eddy et al. (U.S. Patent No. 6,159,588).

The Examiner acknowledged that PHC lacked mention of the combination of various particles sizes required by claim 8. The Examiner added the description of a fuser for photocopy processes in Eddy. This fuser comprises a fluoropolymer binder having crosslinked silicone particles, micron-sized alumina, and high surface-area alumina having a smaller particle size than the micron-sized alumina. The Examiner concluded that it would have been obvious to select the two alumina materials from Eddy and incorporate them into the PHC double-sided adhesive tape in a mixture with another filler (see Office Action page 9, ¶18). The asserted motivation of the Examiner's argument was to improve processability and conductivity.

The Examiner's combination does not provide all limitations of the claimed invention. Eddy describes an intermediate layer thickness of 0.05 to 10 mm and the need for a thicker layer of 1 to 10 mm in combination with the fuser cited by the Examiner (see col. 7 line 61 -- col. 8 line 7). The double-sided tape of PHC also lacks the thickness level required by the present invention.

Thus, the *prima facie* case of obviousness has not been met and the rejection should be withdrawn.

Claims 1-2 and 7-8 stand rejected under 35 U.S.C. § 103 as purportedly being unpatentable over Eddy et al. (U.S. Patent No. 6,159,588).

The Examiner stated that Eddy described a fuser member comprising a substrate and a conductive fusing layer, the fusing layer comprising a fluoropolymer binder having crosslinked silicone particles, and two different sizes of alumina particles. The Examiner acknowledged that Eddy did not describe the heat conductive sheet required by the present invention, but cited col. 4 line 64- col. 5 line 8 for various substrates. The Examiner concluded that it would have been obvious to coat the fusing layer of Eddy on a metal or plastic sheet to reach the heat conductive sheet of the present invention.

The citation in Eddy describes suitable shapes for fixing toner images on a copy substrate and notes that hollow cylindrical metal cores are typical. The Examiner's acknowledgement that Eddy does not describe the heat conductive sheet required by the present invention indicates that all of the limitations of the present invention are not present in the reference and that the *prima facie* case of obviousness has not been met.

In addition, the Eddy reference "must be considered as a whole and must suggest the desirability and thus the obviousness" of the claimed invention. MPEP § 2141, citing *Hodosh v. Block Drug Co., Inc.*, 786 F.2d 1136, 1143 n.5 (CAFC 1986). Without use of "impermissible hindsight vision afforded by the claimed invention", the reference must create a "reasonable expectation of success" in the claimed invention. (Id.) Nothing in Eddy describes, teaches, or suggests the heat conductive sheet of the present invention. Nothing in Eddy provides any reasonable expectation of success in reaching the inventive heat conductive sheet having a very thin substrate of aluminum foil or polyolefin film. The invention cannot be constructed from the Eddy disclosure without the impermissible hindsight gained from the present specification. Thus, it is believed that the *prima facie* case of obviousness has not been met and the rejection should be withdrawn.

Claim 10 stands rejected under 35 U.S.C. § 103 as purportedly being unpatentable over Parker-Hannifin Corp. (PHC) in view of Matsushita Denki (JP 11033456 A) (MD).

The Examiner stated that PHC applied as described above but it lacked any teaching of the steps required in claim 10. The Examiner added MD for the coating method involving spraying an adhesive through a nozzle toward a substrate moved by a supporting conveyor.

The Examiner's combination lacks the thin substrate required by the invention. The Examiner's combination of the MD coating method for the PHC double-sided tape lacks any

reasonable expectation of success due to the abrasive nature of the required heat conductive filler (these are known as abrasive particles, see, e.g., specification page 9 lines 8-10), and further due to the PHC adhesive being provided on both sides of the thick substrate.

In addition, claim 10, as amended, requires a very thin substrate. These features are not shown in the Examiner's combination. Thus, all elements of the present invention are not present in the combination so the *prima facie* case of obviousness has not been met and the rejection should be withdrawn.

Claim 10 stands rejected under 35 U.S.C. § 103 as purportedly being unpatentable over Nishizawa in view of Matsushita Denki (JP 11033456 A) (MD).

The Examiner stated that Nishizawa applied as described above but it lacked any teaching of the steps required in claim 10. The Examiner added MD for the coating method involving spraying an adhesive through a nozzle toward a substrate.

The Examiner's combination lacks the thin substrate required by the invention. The Examiner's combination of the MD coating method for the Nishizawa composition lacks any reasonable expectation of success due to the abrasive nature of the required heat conductive filler. Nothing in the Examiner's argument shows that the MD spray nozzle method is suitable for the abrasive particles of the heat conductive filler in the invention.

In addition, claim 10, as amended, requires a very thin substrate as well as a film or re-peelable adhesive tape support. These features are not shown in the Examiner's combination. Thus, all elements of the present invention are not present in the combination so the *prima facie* case of obviousness has not been met and the rejection should be withdrawn.

In summary, the rejections of claim 10 under 35 U.S.C. § 103 as purportedly being unpatentable over PHC in view of MD and Nishizawa in view of MD have been overcome and should be withdrawn.

New claim 11 adds additional limitations to claim 1. Claim 1 is patentable for the reasons given above. Thus, claim 11 should likewise be patentable. New claims 12-17 each add additional limitations to claim 10. Claim 10 is patentable for the reasons given above. Thus, claims 11-17 should likewise be patentable.

USSN: 09/719,893


Docket No.: 55259US005

In view of the above, it is submitted that the application is in condition for allowance. Reconsideration of the application is requested. Allowance of claims of the pending claims, as amended, at an early date is solicited. If the Examiner feels that any remaining questions or issues may be resolved through a discussion with Applicants attorney, the Examiner is invited to contact me at the telephone number below.

Registration Number 47,634	Telephone Number 651-737-2325
Date 13 June 2002	

Respectfully submitted,

By

  
Dean M. Harts

Office of Intellectual Property Counsel  
3M Innovative Properties Company  
P.O. Box 33427  
St. Paul, Minnesota 55133-3427  
Facsimile: (651) 736-3833

**Version With Markings to Show Changes Made****In the Specification:**

Please amend the paragraph on page 19 beginning on line 4 and ending on line 8 with the following:

To evaluate the handling property of the heat conductive sheet, the heat conductive sheet [10] was fitted as a heat transfer sheet between an LSI chip [14] and heat radiation fins [16] in an[the] LSI device [shown in Fig. 4]. The heat conductive sheet could be fitted easily and reliably without any problems such as wrinkles, rupture, fitting mistakes, and so forth.

**In the Claims:**

1. (First Amendment) A heat conductive sheet including a substrate having a thickness from 1 to 12  $\mu\text{m}$  and a heat conductive resin layer applied to at least one surface of said substrate, characterized in that said heat conductive resin layer contains a binder resin, and a heat conductive filler dispersed in said binder resin.
5. (First Amendment) A heat conductive sheet according to claim 1, wherein said binder resin comprises at least one resin selected from a silicone gel resin, a urethane resin, a synthetic rubber [type] resin, and an acrylic thermoplastic resin.
10. (First Amendment) A method of producing a heat conductive sheet including a substrate and a heat conductive resin layer applied to at least one surface of said substrate, comprising the steps of supporting said substrate by a support; applying a film-forming resin composition containing a binder resin and a heat conductive filler to a non-supporting surface of said substrate to form a heat conductive resin layer; and separating the resulting heat conductive sheet from said support; wherein said substrate has a thickness from 1 to 12  $\mu\text{m}$ .